



# **CONCEPTUAL SCOPE OF SERVICES**

## **INDEPENDENT ENGINEERING EVALUATION AND FINAL PLANNING FOR THE STOCK ISLAND SEWER SYSTEM**

**January 12, 2004**

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### **INTRODUCTION**

The Consultant shall review the following conceptual scope of services and prepare a formal scope to confirm specific work activity that will be performed, along with estimated consulting fees and expenses to perform the work. The Consultant's formal scope shall confirm the work tasks and elements as described below and shall provide additional details related to the execution of the work and any assumptions, exclusions, or other conditions necessary to ensure proper execution of the requisite work. A fee and expense estimate shall be prepared with specific line items for each task and subtask as listed below. Each line item shall clearly indicate task or subtask name, staff level billing categories, unit billing rates, manhours by billing category, total manhours, and any related expenses associated with the execution of the work. A preliminary project schedule shall be prepared in Gantt format to provide the County with a general understanding of how the work will be executed and overall time frames required to complete each work task. Critical milestone dates for deliverables shall be clearly identified on the Gantt chart.

The Consultant is advised that a substantial vacuum sewer system was recently installed on south Stock Island to serve a large portion of the existing users that are present in that portion of the island. The ultimate purpose of this independent engineering evaluation is to use the existing system to fully support both current users that the collection system was intended to serve and potentially future users. It is anticipated that a second sewer collection system will be required to serve the remaining portion of the island, as well as potentially some users currently served by the existing system. The intent of this evaluation is to fully evaluate both existing and future potential users, take into account possible variations in the spatial population of the island through time, and identify large wastewater generators (users) that could affect the selection, layout, and design of not only a new sewer system, but possibly modifications to the existing vacuum sewer system. In the end, the sewer systems developed to serve the users of Stock Island should have sufficient capacity and be robust in its design to allow additional sewer capacity to address potential fluctuations in population and land use.

### **TASK 1 – EVALUATE EXISTING STOCK ISLAND SERVICE AREA**

The purpose of this initial task is to review existing planning information, confirm and/or establish specific planning criteria, and estimate potential wastewater flows through a 20-year planning horizon for Stock Island. The work conducted under this task should build upon previous planning efforts including the 2000 Master Plan prepared by CH2M Hill, the KW

Resort Utilities (the local Utility System) Master Plan prepared by Weiler Engineering, and any other existing planning documents that may have been recently generated by Monroe County in relation to Stock Island. This task is subdivided into three distinct activities as further described below.

#### **A. Land Use Projections**

Monroe County will provide the consultant with the most recent zoning, planning, and land use maps available for Stock Island. Utilizing this information, redevelopment trends within the Key West area, and the existing Wastewater Master Plans, the Consultant will establish a 2025 "build-out" population for Stock Island. The 2025 population estimate will be used to establish the required future capacity of the collection system(s) and treatment facility in order to provide adequate sanitary sewer service capacity to the entire island through a 20 year planning horizon.

Part of the work effort required for the land use projections subtask is the generation of updated population density maps and sewer user classification maps for the local Utility System's service area. Potential 2025 population densities in the service area shall be adequately mapped and delineated on the land use maps. All maps shall be prepared using an appropriate scale that clearly shows all property lines, public right-of-ways, utility and other special easements, and the various infrastructure that currently serves Stock Island (i.e., roads, water lines, sewer lines, stormwater drainage, etc.). Draft versions of the maps shall be prepared and submitted to the County and the Utility System for review and comment before finalizing them.

#### **B. Flow Projections**

Based on the anticipated land uses on the island as well as growth rates for the area, wastewater flow rates will be projected. The rates will be determined utilizing per capita rates that are consistent with other portions of the service area as determined by historical water use records and other viable data sources. Flow rates for the years 2005, 2010, 2020, and 2025 (or build-out) will be estimated. All estimated flows will be inventoried per user along with an estimated EDU count that is consistent with the Florida Keys Aqueduct Authority (i.e., 167 gpd/EDU) and that used by the Utility System (i.e., 205 gpd/EDU).

All potential users that will be served by the sewer system shall be properly classified and categorized in terms of the average daily quantity of wastewater generated. Potential users shall be grouped into two primary categories: (1) small users that generate less than 1,000 gallons per day (gpd) and, (2) large users that generate greater than 1,000 gpd. All larger users shall be properly delineated on the land use maps. A table shall be prepared to inventory all large users, their EDU counts, and their locations keyed into the land use maps. All users both existing and future for the various planning years shall be inventoried along with their wastewater flows to establish the total requisite capacity for the wastewater treatment plant and its associated disposal system(s).

### **C. System Reserve Capacity**

The existing vacuum collection system previously referenced above was sized to provide sufficient capacity for current and future users that are present along and near the four primary vacuum headers found in this system. There are generally two types of connections that should be available to this system: valve pits and buffer tanks. Valve pits are usually used to serve low flow users (i.e., less than 1,000 gpd), while buffer tanks are used to serve large flow users (i.e., greater than 1,000 gpd). Based on a preliminary engineering review of this system, there appears to be reserve capacity available in this system with respect to main size (diameter) and vacuum pump capacity. However, the total number of connections to the system for large users is limited to 25% of the total number of connections to the system. According to feedback from the engineer of record for this sewer collection system (Weiler Engineering), there is limited to no ability to add any more buffer tanks due to the 25% connection limit as mandated by the system provider (AIRVAC).

There are two goals associated with this subtask. The first goal is to estimate the remaining available capacity for each of the four existing vacuum sewer mains, the vacuum pump station, and the wastewater treatment plant and its associated disposal system(s). The Consultant shall confirm to the degree possible how much wastewater flow is currently conveyed in each vacuum main to the treatment plant as well as the maximum rated vacuum carrying capacity of each main. Similarly, the total current volumetric rate of wastewater transferred to the treatment plant shall be verified along with the total potential volumetric rate available by the current vacuum pump station. The difference in the values estimated for the mains and vacuum pump station shall be considered the available reserve system capacity for the collection system. A separate analysis shall be conducted to confirm the available reserve capacity of the treatment plant and disposal system(s). The reserved capacity estimated for the existing collection system, the treatment plant, and its disposal system(s) must be determined in order to establish what portion(s), if any, of the unserved area can be connected to the existing system.

The second goal of this subtask is to identify those lines that have matched, exceeded or are about to approach 25% of their total connections via buffer tanks. All large users along the routes of existing vacuum collection mains should already have been identified through the work completed in Task 1B. In an effort to reduce hydraulic loads within the existing collection system, the Consultant shall consider which large users currently attached to the existing vacuum collection system could potentially and cost effectively be served by the separate, proposed sewer system, which will be conceptually designed in Task 3 to serve the remaining portion of the island.

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**TASK 2 – OPTIMIZATION OF EXISTING COLLECTION SYSTEM**

The consultant will evaluate up to nineteen (19) large properties, currently planned to be connected to the existing collection system, to determine whether their respective connection points should be the existing vacuum collection system or the proposed collection system to serve the remaining portion of Stock Island. Alternative on-site configurations for the various properties shall be considered. Alternative configurations include different types of collections systems (vacuum versus low pressure, etc.) as well as various physical configurations for service lines, on-site vacuum mains, and points of connection and types of connections (vacuum stub-outs from the right-of-way, valve pits, buffer tanks) to the existing system. The following subtasks shall be conducted to support this task.

**A. On-Site Meetings with Property Owners**

**[STATE IN HERE THAT URS IS NOT HANDLING ANY DECOMMISSIONING ISSUES WITH THE PROPERTY OWNERS]**

The Consultant shall meet and work closely with each property owner to assess what areas within each property are suitable for the installation of new infrastructure. A specific date and time for an on-site meeting with each affected property owner shall be scheduled and conducted. Specific points for wastewater collection from individual units on the property shall be identified and properly documented. The relative location of the existing vacuum collection system in relation to each property shall also be verified during the site visit. If there is existing collection infrastructure present on-site, which could be used in lieu of new infrastructure, the Consultant shall document the location of such existing on-site infrastructure and make use of existing components to the extent possible. If the existing on-site components require rehabilitation and/or upgrading to meet industry standards, the Consultant shall assess what modifications must be made to the existing system and include these in the conceptual level plan and cost estimate. The Consultant will NOT provide direct assistance or guidance to the property owners with respect to decommissioning requirements. The property owners shall be responsible for decommissioning in accordance with County requirements in conjunction with their selected Contractor.

The Consultant shall prepare a scalable plan of each property to document the locations for wastewater service on-site, the location, type, and condition of any existing infrastructure, any apparent on-site obstacles that could affect how the on-site collection system would be configured, and the proposed point or points of connection to the existing vacuum collection system.

**B. Alternative Analysis of On-Site System Configuration**

The Consultant shall conduct a proper analysis of alternative types of collection systems and shall use conceptual level costing to compare the cost of one type of system versus another. Alternative points of connection to the existing vacuum collection system shall be considered in the analysis. If the Consultant establishes that the most appropriate and cost effective connection to the existing system is a buffer tank, the Consultant shall document this for

further consideration during Task 3. The Consultant shall prepare a conceptual level plan (graphic) for the most cost effective on-site collection system that illustrates the new components and configuration of the on-site system for each property as well as the use of any existing infrastructure, if it can be used to defray the overall cost to the property owner. In addition, a detailed conceptual level estimate shall be prepared and included with the plan to verify total costs associated with the on-site collection system including (1) final engineering design, surveying, permitting, and construction. The Consultant shall assemble and present the cost estimate in a format that is easily interpreted by each property owner so that he/she has the opportunity to independently evaluate certain costs associated with their on-site collection system. (If requested by the property owner, the Consultant shall also present the results of the comparative cost analysis for the alternative on-site sewer system configurations to confirm that the most cost effective configuration was adopted.)

The Consultant shall submit to each property owner the results of the on-site sewer system analysis complete with the cost estimate. The Consultant shall explain the results of the alternatives analysis with each property owner and obtain written acknowledgement from the property owner that he/she has: (1) reviewed the results of the alternatives analysis, (2) understands the conceptual level plan for the various components associated with the on-site system, (3) the point(s) and means of connection to the Utility System's collection system, (4) upgrades, modifications, and/or rehabilitation work needed for any existing on-site infrastructure, and (5) confirms that the recommended system is the most cost effective alternative for the property owner while also considering cost impacts to the County before pursuing final engineering design.

### **TASK 3 – CONCEPTUAL SEWER DESIGN FOR REMAINDER OF STOCK ISLAND**

#### **A. Evaluate Alternative Sewer Systems Configurations**

Although the existing collection system is a vacuum system, the Consultant will evaluate other alternatives for providing service to the remaining portion of the island. Systems to be considered include Grinder-type pump stations (i.e., low pressure), a STEP system as well as a vacuum system. In addition to the unsewered areas of the island, any large users with a buffer tank that are currently served by the existing vacuum collection system, as well as any of the 19 properties for which a buffer tank was identified as the most cost effective type of connection method shall be revisited. If a connection to the separate (proposed) sewer collection system can be accomplished cost effectively for a portion of the large users currently connected to the existing vacuum system, consideration shall be given to serving those users via the proposed collection system.

Again, the intent of reducing the number of large users (buffer tanks) on the existing collection system is to (1) allow the installation of buffer tanks, if needed, to serve some or all of the remaining 19 properties if these components are established as being the most cost effective solution for those properties, and (2) restore reserve capacity to the existing

collection system for the addition of more large users in the future, if needed. Preliminary layouts for the proposed alternative systems will be developed along with estimated construction costs. A 20-year life cycle cost analysis (from 2005 through 2025) will be developed to take into account estimated annual operating costs for each system. Based on the findings from the alternative analysis and life cycle costing, a preferred system configuration will be recommended.

#### **B. WWTP Expansion Requirements**

Based on the service area build-out needs, the Consultant shall identify anticipated flow rates to the Utility for its use in planning modifications to the existing treatment facility, both in terms of hydraulic capacity and treatment capabilities to meet the future AWT treatment limits. The Utility will be responsible for the required planning activities associated with meeting both hydraulic and AWT treatment goals based on the flow estimates developed by the Consultant.

#### **C. Recommended Expansion Program**

Based on the results of Subtasks A and B for Task 3, a plan for providing wastewater collection for the un-sewered areas will be developed. Impacts to the existing wastewater treatment plant will be discussed. A preliminary layout of the proposed collection system will be provided. Budgetary construction costs for performing this work will be developed as well as a preliminary design/construction schedule. The expansion plan shall include a phasing diagram or schedule to illustrate when specific engineering planning, design, permitting, and construction activities should occur to ensure that all sewer connections can be completed in a timely manner without jeopardizing reserve capacity of the treatment plant and/or collection system. Due to the conceptual nature of this document, the costs estimates will be budgetary in nature, and shall be suitable for planning purposes by the County.

### **TASK 4 – SUMMARY REPORT**

The results of Tasks 1 through 3 will be summarized in a Preliminary Engineering Report (PER). The PER will present and cover the following aspects:

- Existing and Projected Wastewater Capacity Needs of the Island through 2025;
- Alternative Sewer Configurations that were Evaluated;
- Recommended Sewer Configuration of New Sewer System;
- Modifications Proposed for the Existing Vacuum Collection System;
- Conceptual Plans (total of 19) for Private On-Site Collection Systems;
- Conceptual Construction Costs for Sewer System Expansion and Modification, and
- Phasing and Implementation Plan and Timeline for WWTP and Sewer System Expansion.

Copies of the draft report will be provided to the County for review and comment. A third party review of the draft PER will be conducted by a County appointed engineering firm (TBD) to validate the results developed and presented in the report. Based on the comments received, the Consultant shall finalize the report and issue 10 copies of the report in final format. The finalized report will be recommended to be the Basis of Design for expanding the Stock Island wastewater system to serve the remaining portion of the island.

#### **TASK 5 – THIRD PARTY REVIEW**

Given the nature of this project, an independent third party review will be conducted at various stages of the project. The first review will be conducted after the service area flows have been established and the existing system has been optimized. The second review will be conducted after the recommended system expansion plan has been developed. The final review will occur after the draft report has been submitted. The Consultant will receive comments after each of these reviews and should be prepared to meet with County to discuss and address the comments.

#### **TASK 6- PUBLIC OUTREACH PROGRAM**

In order to keep the public informed as to the progress of this project, several workshop type meetings will be conducted. A summary of proposed meetings that the Consultant must attend through the course of the project are identified and described below:

- **Public Outreach Meetings** – An introductory meeting will be held with the Consultant, the BOCC and other County personnel, and the affected property owners during a special session of the BOCC. The Consultant will be introduced to the various affected property owners, and will present a brief approach to be used for final resolution of outstanding concerns. During this meeting, the Consultant shall be ready to discuss alternative sewer system configurations, technical and/or feasibility limitations associated with one or more sewer options, and an overview of the planning and design process. Immediately following this meeting, the Consultant shall begin a formal on-site interview with each property owner. It is anticipated that these meetings will require approximately 1 to 1.5 hours per property to complete the activities described above for Task 2B.
- **Special BOCC Meeting #1** – Upon completing the on-site evaluation for the 19 affected properties and obtaining “unofficial” buy-in from each property owner, the Consultant shall attend a special BOCC meeting to review the results of the on-site engineering evaluation and shall summarize what type of system(s) will be installed to serve each property along with an estimated cost. The cost estimates presented to the BOCC should clearly define those costs that will likely be borne by the property owner (assuming no subsidies) as well as those costs for which the County and/or Utility will be responsible for.
- **Special BOCC Meeting #2** – The third and final workshop meeting will be conducted once the proposed build-out system configuration for Stock Island is developed. The recommended type of system along with its conceptual layout shall be presented and



discussed. Any modifications that should be made to the existing vacuum collection system shall also be reviewed and discussed including the potential elimination and/or addition of buffer tanks, valve pits, etc. Per the results of the engineering evaluation, those users currently served by the existing vacuum collection system which should be switched to and served by the separate proposed sewer system will also be identified. Finally, the Consultant will present the recommended system expansion and phasing plan for the sewer collection system, treatment plant, and disposal system(s).

The Consultant shall complete the work described herein within four (4) months from receipt of the Notice to Proceed from the County.